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EXAMINER	
SMITH, JENNIFER A	
ART UNIT	PAPER NUMBER
4116	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/501,449	BACH ET AL.	
	Examiner	Art Unit	
	JENNIFER A. SMITH	4116	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) *10 and 11* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 12-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/13/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election Acknowledged

Telephonic Restriction

During a telephone conversation with Mr. William Gerstenzang on December 12, 2007, a provisional election was made to prosecute the invention of Group I, claims 1-9, 12-15. Affirmation of this election must be made by applicant in replying to this Office action. Claims 10-11 have been withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Restrictions

Restriction is required under 35 U.S.C. 121 and 372. This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted. Restriction to one of the following inventions is required under 35 U.S.C. 121:

Group I, claim(s) 1-9, 12-15, drawn to a process for thermal decoking of a zeolite catalyst.

Group II, claim(s) 14-15, drawn to an apparatus comprising a heater, a succeeding reactor , a succeeding dust separator , a succeeding air cooler , and a succeeding compressor.

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Inventions I and II share common technical feature ," zeolite catalyst". Unity exists only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding claimed technical features. The express "special technical features" is defined as meaning those technical features that define a contribution which each of the inventions, considered as a whole, makes over the prior art."(Rule 13.2). The question of unity of invention has been reconsidered retroactively by the examiner in view of the search performed; a review of Grosch et al. US Patent No. 6,380,119 B1 makes clear that the claimed species is not novel over the prior art (the instantly claimed compounds). Furthermore, these references appear to demonstrate that the technical feature(i.e. ," zeolite catalyst") does not define a contribution which each of the inventions, considered as a whole, makes over the prior art. Thus, lack of unity becomes apparent "a posteriori" after taking the prior art into consideration. Accordingly, the prior art of the record supports restriction of the claimed subject matter in to the groups as mentioned immediately above.

Joint Inventors

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Status of Application

Claims 1-9, 12-15 are presented for examination.

Claims 10-11 are withdrawn from consideration.

Information Disclosure Statement

The information disclosure statement (IDS) was submitted on 06/01/2007. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner. Please refer to applicants' copy of the 1449 submitted herewith.

Drawings

The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. The claims make reference to numbered parts of a drawing submitted with the PCT application but the drawing has not been submitted in national stage. Applicant is required to furnish a drawing under 37 CFR 1.81(c). No new matter may be introduced in the required drawing. Each drawing sheet submitted

after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d).

Claim Rejections - 35 USC § 112 – 2nd Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "the greater amount" of the nitrogen/air mixture in claim 9, line 2 is a relative term which renders the claim indefinite. The term "greater amount" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is not clear what amount of the nitrogen/air mixture is recirculated to the reactor and what amount is discharged to the atmosphere. Therefore, one would not know what the metes and bounds of the claims are.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Grosch et al. US Patent No. 6,380,119 B1.

The **instant claim 1** is drawn to a process for the thermal decoking of a zeolite catalyst. The catalyst is used for producing lower olefins from a mixture of higher olefins or from methanol or dimethyl ether. The process occurs in a reactor having a bed of granular zeolite catalyst comprised of pentasil-type alumosilicates. Process steps:

(1) the reactor is rinsed with a nitrogen steam at an entrance T of 460-500°C

(2) nitrogen steam is passed through the reactor at a T of 420-460°C

(3) a nitrogen/air mixture is gradually heated and flows through the reactor at 460-500°C until the zeolite catalyst is completely decoked.

(4) the reactor is rinsed with a nitrogen steam at a T of 460-500°C

Grosch et al. (**D1**, hereafter) teaches in **Abstract** a process for regenerating a zeolite catalyst with the stages:

(I) heating a partially or completely deactivated catalyst to 400-500°C in an atmosphere which contains less than 2% by volume of oxygen,

(II) treating the catalyst at 350 to 600°C with a gas stream which contains from 0.1 to 4% by volume of an oxygen-donating substance or of oxygen or of a mixture of two or more thereof, and

(III) treating the catalyst at from 350 to 600°C with a gas stream which contains 4 to 100% by volume of an oxygen-donating substance or of oxygen or of a mixture of two or more thereof and a regenerated catalyst is obtained.

In a further step (IV) an inert gas steam is employed. This includes 0.5-20 vol% of vaporized liquid selected from the group including water, a nitrile, or a hydrocarbon. [**Column 11, lines 55-62**].

The oxygen-donating substance can be oxide of nitrogen such as N_2O or an N_2O containing gas.

The zeolites are known to be crystalline aluminosilicates having ordered channel and cage structures. [**Column 2, lines 41-43**]

The invention of D1 relates to the use of the zeolite catalyst for the olefin reactions of two to six carbon atoms. [**Column 12, lines 32-36**]

Instant claim 2 is drawn to the process of claim 1 wherein the nitrogen/air mixture contains up to 75 vol% steam.

Instant claim 13 is drawn to the process of claim 2, wherein said amount of steam is 40 to 60 vol. %.

D1 teaches stage **(III)** the gas steam contains 4-100, preferably 3-20, more preferably 2-20 vol% oxygen containing substance [**Column 10, lines 1-5**]. In this case the oxygen containing substance is the nitrogen steam and **D1** anticipates these volume percentages by providing the broad range of 4-100 vol%.

Instant claim 3 is drawn to the process of claim 1 or 2 wherein the reactor is rinsed with nitrogen for 8-16 hours in step (1).

Instant claim 4 is drawn to the process of claim 1 or 2 wherein the reactor is cooled with nitrogen for 1-8 hours in step (2).

D1 teaches, in [**Column 10, lines 19-23**] the duration of the treatment in stage II and stage III if required is in general from 1-30 hours, preferably 2-20 hours, in particular 3-10 hours in each case. The range of **D1** anticipates the instant claim 3.

D1 teaches, after the temperature range of from about of about 400-600°C, desired for decomposing the coatings has been reached in step (I), it is possible--if desired, or if necessary because of the presence of a large amount of organic coatings--to leave the catalyst for a further 1 to 2 hours at these temperatures in the atmosphere defined above. [**Column 9, lines 25-30**]. Therefore the state of the catalyst is responsible for the determination of the duration of treatment.

Instant claim 6 is drawn to the process of claim 1 or 2 wherein the air content of the nitrogen /air mixture is initially 2-10 vol% but raised to 50 vol% during the decoking process.

D1 teaches as the coatings are increasingly being burnt off, the content of oxygen-donating substances must be increased up to 100 vol% in order to maintain the temperature required for regeneration so that after the end of stage (II), in stage (III) the catalyst is treated. **[Column 9, lines 62-67]**. Earlier, in the rejection of claim 1 **D1** demonstrated that at the end of stage (II), there is 0.1 to 4% by volume of an oxygen-donating substance. Therefore an increase in oxygen content (air) is disclosed by the reference **D1**.

D1 teaches during the heating process in which the catalyst is heated to a temperature at which the generally organic coatings present there begin to decompose, while at the same time the temperature is controlled by means of the oxygen content and does not increase to an extent which damages the catalyst structure.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 5, 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grosch et al. US Patent No. 6,380,119 B1 in view of Crocco et al. US 5,741,749.

Instant claim 5 is drawn to the process of claim 1 or 2 wherein the nitrogen/air mixture of step (3) is heated in several process steps and the entrance temperature for each of said process steps is kept constant up to 24 hours.

Instant claim 14 is drawn to the process of claim 5, wherein said entrance temperature is kept constant for 8 to 16 hours.

Instant claim 15 is drawn to the process of claim 14, wherein said entrance temperature is kept constant for 8 to 12 hours.

D1 teaches the process of claims 1 and 2 but does not specify heating the entrance and keeping the temperature constant.

Crocco et al. (**D2**, hereafter) teaches "the temperature may be kept constant during regeneration or may be periodically or continuously increased or decreased as may be desired." Heating conditions are a design parameter than can be set by one reasonably skilled in the art. While **D1** does not disclose these thermal conditions **D2** teaches that they can be optimized without undo experimentation.

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grosch et al. US Patent No. 6,380,119 B1.

Instant claim 7 is drawn to claim 1 or 2 wherein the nitrogen steam loaded with hydrocarbons from step (1) is discharged and supplied to a thermal treatment.

Instant claim 8 is drawn to the process of claim 1 or 2 wherein the nitrogen steam used for cooling is released to the atmosphere or recirculated to the cycle.

Instant claim 9 is drawn to the process of claim 1 or 2 wherein a greater amount of the discharged nitrogen/air mixture is recirculated than is discharge to the atmosphere.

D1 teaches the process of claims 1 and 2 as evidenced by the above rejection but does not teach conditions for the discharge of the nitrogen streams. One would have been motivated to modify the invention of **D1** by employing recycle streams and thermal treatment of contaminated nitrogen steam because they are

within the level of one skilled in the art and offer economic, environmental, and material advantages. Treatment of the discharged nitrogen stream ensures purity before entering back into the system (recirculating) to maintain the reaction and allow for steady state of the process.

Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Grosch et al. US Patent No. 6,380,119 B1 in view of Moeller et al. US Patent No. 5,981,819.

Instant claim 12 is drawn to process of claim 1, wherein said lower olefins are C_2 and C_3 and said higher olefins are $C_4 – C_8$.

D1 teaches the process of claim 1 but fails to teach properties of the olefin mixture. Moeller et al. (**D3**, hereafter) teaches a process for producing C_3 olefins and C_4 olefins from a feed mixture containing C_4 - C_7 olefins by conversion of the feed mixture on a granular zeolite catalyst at a temperature from 380°C to 700°C [**Column 1, lines 6-10**].

The process disclosed in **D1** is capable of decoking the catalyst disclosed in **D3** because the method of **D3** is substantially similar to that of **D1** and one would have been motivated at the time of the invention to modify the invention of **D1** in view of **D3** because aluminosilicates (when used in the conversion of higher olefins

into lower olefins) must be decoked after about 1000 operating hours and the need exists for an effective process for achieving this. It is likely that the invention of **D1** can be used to process many different types of catalysts although it is not explicitly disclosed. One would have had a reasonable chance of success when combining these two references because **D1** is an effective way of decoking a similar type catalyst (titanium silicate in the examples).

Conclusion

Claims 1-9, 12-15 are rejected.

Claims 10-11 are withdrawn from consideration.

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Smith whose telephone number is 571-270-3599. The examiner can normally be reached on Monday - Friday, 8:30am to 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571-272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Smith
December 19, 2007
TC 4116

JS

/Vickie Kim/
Supervisory Patent Examiner, Art Unit 4116